PHYSICAL CHEMISTRY QUESTION BANK FOR BSC 1st YEAR STUDENTS

Short answer type (2 – 4 marks each)

1. With the help of kinetic gas equation, deduce Avogadro's law.
2. Define mean free path.
3. Define vapor pressure of a liquid.
4. Calculate the height to which water will rise in a glass capillary, If the radius of tube is 0.02 cm, and surface tension of water is 72.8 dynes/cm.
5. Define law of Rational indices.
6. Define the term peptisation.
7. Give Hardy-Schulze law.
8. With help of half-life method, determine the order of reaction.
9. Give one example of each auto catalysis & negative catalysis.
10. For joule Thomson experiment, del H = 0, prove it.
11. What is an ideal gas? Why do real gas deviate from ideal behavior?
12. Give Maxwell's law of distribution of molecular velocities.
13. Explain collision diameter & collision frequency.
14. Differentiate between crystalline & amorphous solids.
15. State first law of thermodynamics & give its mathematical form.
16. What is heat of neutralization? Why heat of neutralization of strong acid & strong base is always 13.7 kcal?
17. Explain first & second order reaction with suitable examples.
18. Define critical temperature. What is it's importance?
19. If a first order reaction is 20% completed in 1200 second. Calculate the time for 80% completion of the reaction.

20. Explain extensive & intensive properties.

21. Show that excluded volume of a gas is four-time volume of molecule of gas.

22. Write a note on effect of temperature on the surface tension & viscosity of liquid.

23. Derive Bragg equation for crystals.

24. Derive the relation: $C_p - C_v = R$

25. Write a note on classification of catalysis.

26. Describe a system as well as different type of systems.

27. State & Explain Collision number.

28. Describe the Ostwald Viscometer Method for determining viscosity of a liquid.

29. State & explain law of symmetry for crystals with diagrams.

30. Write a note on colloidal solution of liquid in liquid with two examples.

31. Describe Tyndall effect in colloids.

32. Describe the term heat & work in detail.

33. Write difference between rate constant & rate of reaction using suitable examples.

34. State & explain Hess's law of constant heat summation, with suitable examples.

35. Write all the postulates of kinetic theory of gases.

36. State & explain term internal energy.

37. Write the Ramsay-Shield's equation & explain it's significance.

38. Calculate R.M.S velocity of oxygen molecule at 27°C.

39. State & explain first law of thermodynamics.

40. Write a note on liquid crystals.

41. The half life period of a first order reaction is 150 seconds. Calculate the time required for 90% completion of reaction.

42. Write the law of "constancy of angles" for crystals.

43. Explain difference between liquid crystal, solid & liquid.

44. What is emulsion? How can it be prepared ?

45. Derive an expression for second order reaction.

46. Draw the NaCl crystal structure.

47. Calculate most probable velocity pf oxygen gas at 27°C, R= 8.31 $\times 10^{7}$ era / K mol.

48. The rate constant fora first order reaction is 1.54 $\times 10^{-3}$ sec^{-1} .Calculate it's half life time.

49. Explain fcc lattice by drawing the figure.

50. What do you understand by state function?

51. What is relation between RMS velocity & average velocity of gas molecules ?

52. What is difference between ideal gas & real gases ?

53. Determine the miller indices fora plane when the intercepts along the axes are 2a, 3b , & 2c.

54. Define space lattice fora crystal.

55. Define gold number.

56. Write chemical equation for preparation of sulphur sol & silver sol.

57. Discuss pseudo order reaction with examples.

58. Discuss the co**rr**ection due to volume of a gas molecule, as given by van der wall.

59. Write one theory for origin of charge on colloidal particles.

60. Lyophilic colloids are stable than lyophobic, Explain.

61. Define molecularity & order of reaction.

62. Show that radioactive decay is first order reaction.

63. Determine a relation for work done in reversible isothermal expansion.

Long answer type (5 - 10 marks each)

1) (a) Deduce relation for first order rate expression.

(b) Write few application of colloids.

2) (a) Discuss the deviation of real gas from ideal behavior.

(b) Write a note on homogeneous & heterogeneous catalysis.

3) Write note on following:

(a) Law of crystallography

(b) Intermolecular forces in liquids

(c) Thermodynamic system

4) (a) Write note on activation energy & energy barrier.

(b) How is order of reaction determined by differential method ?

5) Write short notes on :

(a) types of catalyst with example

(b) Colloids & their classification

(c) Cubic Unit cell

6) (a) Derive values of critical constants in term of a, b & R.

(b) Describe simple method for determination of viscosity.

7) Explain the following:

(a) Heat of combustion

(b) Law of crystallography

(c) Parachor

8) (a) Describe protective action in colloids with suitable examples.

(b) Prove that fora first order reaction the half-life period is independent of initial concentration.

9) (a) Write note on Joule Thomson effect.

(b) Describe half life period method for determining order of reaction.

10) (a) Describe X - Ray diffraction by the crystal.

(b) Write note on liquifaction of gases.

11) (a) Describe in detail the law of co**rr**esponding states. What is it's physical significance?

(b) Draw crystal structure of CsCl and explain it.

12) (a) Describe bond dissociation energy in detail.

(b) The heat of sublimation of carbon (graphite) is 716 KJ / mol. If the bond energies of H—H, C—H, C—C bonds are 436, 414, 348 KJ / mol respectively. Calculate heat of formation of ethane.

13) (a) Describe all methods for determination of order of reaction.

(b) Describe the radioactive decay.

14) (a) Calculate R.M.S velocity as well as average velocity of chlorine gas molecule at 12°C.

(b) Calculate Miller Indices of crystal planes for which intercept along the axis are:

(i) (a, b, c) (ii) $(1/2, 2/3b, \infty c)$

15) (a) Discuss Arheneous equation for temperature dependence on reaction rates. How activation energy can be determined using this method?

(b) If the value of rate constants fora reaction at 427K & 527K are 2.0 & 32.0 sec^{-1} Calculate the activation energy for this reaction.

16) (a) What is effect of temperature on distribution of molecular velocities.

(b) How will you measure the surface tension of a liquid by capillary rise method?

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